Jul 30th, 11:30 AM - 12:30 PM

Restaurant Industry Risk Dimensions and their Influence on Operating Cash Flows

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ABSTRACT

This paper fills a critical void by investigating underlying dimensions that influence the restaurant industry's cash flows. First, this study develops a set of restaurant industry risk factors (constructs). Next, it is found that the three factor model accounts for 32% of the variation in restaurant industry operating cash flows. The model remains robust after conducting regression analysis with backward elimination procedure. As a result, this paper provides further support to the claim that industry effects are important determinants of explaining the variation in profits (McGahan & Porter, 1997).

Key Words: industry risk factors, restaurant industry, cash flows

INTRODUCTION

The last decade of 21st century is likely to end with a gloomy outlook for almost all industries. Restaurant industry is one of these industries since it also operates in a turbulent and fiercely competitive environment. While the competitiveness of the US restaurant industry is well-known, one critical component of strategic and financial management is acutely missing. This piece is related to factors (dimensions) that influence risk of restaurant firms. There have been some efforts by Borde (1998) and Gu and Kim (2003) and Chung (2005) to delve into risk concept but these works did not produce a definitive set of constructs.

This paper fills a critical void by investigating underlying dimensions that influence the restaurant industry's cash flows. First, this study develops a set of restaurant industry risk factors (constructs). Second, the paper investigates how these factors or value drivers influence restaurant industry operating cash flows. This study contributes to the body of knowledge by proposing an industry-specific model that better reveals the overall picture of risk factors that influence the variation in operating cash flows in the restaurant industry.

LITERATURE REVIEW

The concept of risk is at the foundation of every firm as it seeks to compete in its business environment. According to financial theory, (total) risk is composed of two components, systematic and unsystematic risk. The examples of systematic risk could be changes in monetary and fiscal policies, the cost of energy, tax laws, and the demographics of the marketplace. Finance scholars refer to the variability of a firm's stock returns that moves in unison with these macroeconomic influences as systematic, or stockholder, risk (Lubatkin & Chatterjee, 1994). On the other hand, a loss of a major customer as a result of its bankruptcy represents one source of unsystematic, or firm-specific risk (idiosyncratic or stakeholder risk). Other sources include the death of a high-ranking executive, a fire at a production facility, and the sudden obsolescence of a critical product technology (Lubatkin & Chatterjee, 1994). As a result, in this study we view macroeconomic risk as systematic risk and industry risk as unsystematic risk.

Macroeconomic Risk

Macroeconomic risk is the variation of cash flows or stock returns caused by marketwide factors such as inflation, industrial production etc. We use the original five factors proposed by Chen et al. (1986): industrial production, expected inflation, unanticipated inflation, term structure, and default risk as variables that encompass the macroeconomic risk construct:

a) Monthly growth in industrial production (IP):

$\tilde{I}mp = ln\ (IP(t)) - ln(IP(t - 1))$

b) Short term interest rate which denotes change in expected inflation (EI) ($\tilde{I}DEI$):

$\tilde{I}DEI = Et\ (It+1) - Et\text{-}1(It),$

c) Short term inflation is unexpected inflation (UI):

$\tilde{I}UI = It - Et\text{-}1\ (It),$ where *It* is actual inflation *from t* - 1 to *t.*

d) Default risk (DR) denoted as UPR:

$\tilde{I}\ UPR(t) = BAA\ return(t) - LTGB\ return(t)$, the difference between returns on a low grade (BAA) bond portfolio and a high grade (long term government bond (LTGB)) portfolio.

e) Long term inflation denoted as UTS:

$\tilde{I}\ UTS = LTG\ (t) - TB(t\text{-}1)$ is the difference in returns on a long-term riskless portfolio (LTG) and short-term riskless portfolio (TB).

Industry Risk

Industry risk is defined as change in stock returns and firm profits due to industry effects (Rumelt, 1991). Unlike macroeconomic risk factors the industry-specific risk factors influence a certain group of securities that belong to the same industry group (e.g. beef price affects retail and restaurant industries). In an effort to achieve content validity, the authors conducted a thorough analysis of the published industry and academic literature that implicitly or explicitly mentions the industry factors or forces that affect the overall risk of the restaurant industry. Relevant restaurant industry value drivers were drawn from studies of Choi (1999), Chathoth and Olsen (2007) and Chung (2005) which touched upon business cycles, co-alignment principle, and value drivers in the restaurant industry. A preliminary list of value drivers reported by government agencies (such as Bureau of Labor Statistics), industry equity analyst reports, and industry trade magazines was compiled.

The selection of the variables was based on the following three criteria:

1) The variables should be related to the restaurant industry and must either be used by the NRA or covered in the trade magazines and annual company reports.

2) The variables should have at least 10 years of history

3) The variable should be reported on a monthly basis.

Based on the above criteria, a total of 30 relevant variables were identified and were placed in five broad categories: inflation, labor, industrial production, producer prices, and construction.

Risk in Hospitality Management Research

The concept of risk did not seem to be on hospitality researchers' agenda until De Noble and Olsen (1986) observed market volatility in the foodservice industry. Their findings revealed that almost half of the foodservice executives (N=231) who participated in that study did not make any attempt to evaluate the environmental conditions, demographics trends, technological changes, social/cultural trends, and political/legal factors. Huo and Kwansa (1994) compared the betas of hotel, restaurant and utility firms for the recessionary period of 1990-1991 as determined by the degree of financial leverage (DOL) and degree of operating leverage (DOL). The researchers reported that DFL and DOL accounted for 5% and 16% of the variation in beta for restaurants. Gu (1993) used Sharpe Ratio to evaluate risk-adjusted performance of hospitality firms. His study was followed by Kim, Mattila, & Gu (2002) who examined hotel real estate investment trusts (REITs) risk-adjusted performance by utilizing Jensen Index. In 2003, Kim and Gu conducted a sector analysis of restaurant firms in terms of their risk-adjusted performance. The semi-variance measure (e.g. downside risk-upside volatility) was recently introduced to hospitality management literature by Madanoglu, Lee and Kwansa (2008) who investigated risk-return features of fast-food and casual-dining restaurants.

The first study that looked at how macroeconomic variables affect security returns in the hospitality industry (hotels and restaurants) was conducted by Barrows and Naka in 1994. Their study revealed that expected inflation, money supply, and construction had significant effect on the variation of the stock returns in the restaurant industry. The second study was undertaken by Chen, Kim and Kim (2005) who used hotel stocks listed on Taiwan Stock Exchange. Chen et al. (2005) employed the common five macroeconomic variables which were predominantly used in the literature (namely, ΔIP (change in industrial production, *EINF* (expected inflation), ΔUEP (change in unemployment rate) , $\Delta M2$ (change in money supply), and *SPD* (rate of the yield spread)). These five variables explained merely 8 percent of the variation in hotel stock returns while only two of these variables were significant at the .05 level ($\Delta M2$ and ΔUEP).

In 1998, Borde examined how financial characteristics of a restaurant firm can be utilized in assessing investment risk. The researcher employed liquidity, dividend-payout ratio, leverage, operating returns (Return on Assets), and growth opportunities (which is defined as the average growth rate in earnings before interest and taxes for firm j over the study period) on a sample of 52 restaurants for the 1992-1995 period. Fifty-four percent of the variation in the systematic risk and 59% of the variation in total risk was explained by the model.The follow up study of Gu and Kim (2003a) employed 75 restaurant firms in their research sample for the 1996-1999 period. Their final model comprised of liquidity and asset turnover explained 31% of the variation in beta for the restaurant firms.

In another study Kim et al. (2003) looked at determinants of systematic risk of hotel REITs. Their analysis employed 19 publicly traded REITs for the 1993-1999 period. The independent variables in this study were quick ratio (QR), the average total debt-to-assets ratio (TD/TA), asset turnover (AT), return on equity (ROE), dividend payout ratio (DIV), total capitalization (CAP), and asset growth (GrTA). Three variables had significant t-values in their paper, namely, TD/TA, CAP, and GrTA.

Gu and Kim (2003b) followed up on Kim et al.'s (2003) study by utilizing the same sample and examination period to uncover the determinants of unsystematic risk of REIT's. Therefore, the researchers used the same seven variables to assess their impact on REIT's unsystematic risk. The backward regression method retained three variables (significant at the .05 level): debt ratio (TD/TA), total capitalization (CAP) and dividend payout ratio (DIV). In 2007, Chen investigated macro and non-macro events that impact Chinese hotel stock returns. He reported that non-macro events that could significantly impact Chinese hotel stock returns encompass financial crises, natural disasters, wars, terrorist attacks, political events, and sports mega-events.

Chung (2005) is one of the few researchers who ventured to determine drivers that influence restaurant cash flows in a time-series setting. Her work is concerned with what she calls "economic value drivers". Her investigation covered the ten-year period between 1994 and 2003 and includes publicly traded casual-dining restaurants. She found 13 economic variables that have co-movements and causality with the operating cash flow per unit (OCFPU). Chung employed backward stepwise regression which retained four variables: namely, consumer price index for fish/seafood, producer price index for all commodities, employment to population, and producer price index for finished goods less food and energy. The final model explained 66.6% of the variance in cash flows of the casual-dining restaurants and was significant at the .01 level.

To date, no study attempted to explore the underlying risk dimensions and their respective variables that capture the industry-specific factors that serve to explain the variance in company cash flows. In other words, no study enumerates the industry- specific variables that influence company cash flows. Hence, this study examines this vein of research and enlightens the restaurant industry executives, analysts, and investors about what factors (macroeconomic and industry value drivers) cause volatility in the restaurant firms' cash flows.

METHOD

Sample

The sample of this study is developed from the NRN Index published by the Nation's Restaurant News magazine. The NRN index entailed 81 restaurant firms listed on major US stock exchanges. Since reporting of some of the economic data (such as construction index) began in January 1993, the observation period was 12 years ranging from 1993 to 2004. The major reason for not extending beyond 2004 was due to the going-private wave that led to at least 20 restaurants being delisted from stock exchanges.

Data

All time-series for the 30 industry risk variables are computed by the change/growth (%) as in Chung (2005). In addition, the monthly values of the industry value drivers are transformed into natural logs in order to achieve some stationarity in series (Dufour, Pelletier, & Renault, 2005). The effect of nominal variables to the overall risk of the restaurant industry is assessed by using two dummy variables as in Chen et al. (2005) who used the presidential elections in Taiwan, the 1999 earthquake, the outbreak of the SARS epidemic, the 2000 Sydney Summer Olympics, the 2002 Japan/Korea World Cup Tournament, the Asian economic crisis of 1997–1998, the Iraqi war in 2003 and the terrorist attacks upon the United States in September, 2001, and called those variables "non-macroeconomic forces". The first nominal variable in this study is the Mad Cow disease outbreak that was announced in March 1996 by the British Government and the second dummy variable is related to the terrorism events of September 11, 2001 that occurred in the United States. Dummy variables were coded as 1 for the quarters affected by the events and 0 for the other observation periods. The length of the effect of the dummy variables was extended to two quarters as cash flow is reported on a quarterly basis.

The dependent variable (Operating Cash Flows) was calculated as suggested by Sloan (1996) and Fairfield et al. (2003). The data for accounts receivable, inventories, other current assets, accounts payable, current liabilities, depreciation and amortization expense and operating income before depreciation was obtained from the Compustat Database. Quarterly values for the operating cash flow (OCF) for each firm are standardized (scaled) by dividing the cash flow with net sales as in Harford (1999).

Data Analysis

We used Exploratory Factor Analysis (EFA) in order to uncover underlying risk dimensions. Prior to entering the 30 variables into the analysis we checked for multicollinearity and removed variables which had pairwise correlation with another variable over .90. Thus, 20 variables were included in EFA (See Appendix). The authors used Principal Components Analysis (PCA) with Varimax Rotation. Hair et al. (1998) view a loading of .40 as "more important" and a loading of .50 as "practically significant." We adopted .50 as our cut off score. In addition, variables that cross-load on several factors with a loading of .50 are excluded from further analysis. In addition, we put forward the following three criteria to decide on the number of emerging restaurant industry risk factors as suggested by Dunteman (1989): 1) All selected factors should have an eigenvalue that is higher than 1, 2) Selected number of factors should explain more than 50% of the variance, and 3) the number of factors in the first two steps should be in some congruence with the Catell's (1952) scree plot results (i.e., if the elbow suggests a three-factor solution, the author can select between 2 and 4 factors as a solution).

We also checked for two types of reliability: composite reliability and average variance extracted (AVE) by each construct. The composite reliability, as calculated with Lisrel estimates, is analogous to coefficient alpha and was calculated by the formula provided by Fornell and Larcker (1981). In addition, the construct validity was tested through the tests of convergent validity and discriminant validity.

After grouping variables under their respective factors, the researchers needed to decide on how to use emerging factors as "operationalized" independent variables in a subsequent regression analysis. We followed the recommendation of Hair et al. (1998) for using factor scores when the scales used to collect the original data are "well-constructed, valid, and reliable" instruments. Since the factors in this study are subjected to Confirmatory Factor Analysis, the factor scores approach is used in a subsequent analysis. In addition, a cross correlation function (CCF) is utilized since cash flows are affected by the macroeconomic or industry variables with some time lag and correlational analysis ignores the lead-lag relationship between variables (Brooks, 2002; Cheung & Ng, 2003). In addition, we made adjustments for seasonality and inflation. Last, we checked for autocorrelation and multicollinearity. Last, we run a full-model which consisted of all macroeconomic and industry variables. Then we run an analysis by using backward elimination regression procedure to uncover which variables remain in the parsimonious model.

FINDINGS

Factor Analysis

The EFA yielded 3 factors which had eigen values over 1 and cumulatively accounted for over 75% of the explained variance. The first factor was labeled as "Output" since it represents multiple aspects of the restaurant industry: labor cost, food cost via CPI, and industrial production. This factor encompassed eight variables, had an eigenvalue of 10.385 and accounted for more than half of the extracted variance (51.927) (See Table 1). The second restaurant industry risk dimension was labeled "PPI Meats" as it consisted of three meat-related producer price value drivers. The last factor had an unconventional structure as it included two industrial production variables (IPBUTTER and IPDAIRY) and one employment variable (AWKLH). As a result, this restaurant industry latent variable was named "PPI Restaurants.

The composite reliability values for all three factors were above the acceptable threshold level of .70 proposed by Hatcher (1994) while the "Output" factor had the highest construct reliability (0.96) In terms of extracted variances, all factors had average extracted variances exceeding the 0.50 level. All indicator loadings had significant *t* values ($t > 1.96$, $p < .05$); hence, convergent validity was established for the industry risk dimensions model.

A test of discriminant validity is conducted by constraining the correlation parameter between the three constructs at 1.0 and then observing the Chi-square difference values for the unconstrained and constrained models. The results showed that the Chi-square value for unconstrained model (χ^2=749.70, df 75) was significantly lower than that of the constrained model (χ^2= 1320.41, df 75) at .01 level which demonstrated that discriminant validity held for the restaurant industry risk model.

Table 1
Results for Exploratory Factor Analysis

Factor Name	EV*	PV**	CV***	Variables	Factor Loading
Output	10.385	51.927	51.927		
				1.IPMEATS	.890
				2.CPINDEX	.825
				3.IPPOULT	.815
				4.IPCHEESE	.803
				5.IPPORK	.776
				6.CPITOM	.757
				7.IPBEEF	.739
				8.AGGWKHL	.712
PI Meats	2.811	14.054	65.981		
				1.PPPLTRY	.856
				2.PPIMEAT	.746
				3.PPIPORK	.679
PPI Restaurants	1.939	9.696	75.677		
				1.IPDAIRY	.845
				2.AWKHL	-.711
				3.IPBUTTER	.663

Notes: * EV=Eigen Value, **PV=Percent of Variance, ***CV=Cumulative Variance

Regression Analysis

Results revealed that no autocorrelation and multicollinearity was present in this analysis. The findings demonstrated that none of the macroeconomic variables and dummy variables had a significant relationship with the restaurant industry cash flows (See Table 2). On the other hand, the R-squared was significant at the .05 level which indicates that cumulatively macroeconomic variables explain a significant portion of variation in cash flows. It is worth noting that while there was no multicollinearity among independent variables, relatively high correlation among variables resulted in no significance at a variable level.

Table 2
Regression Coefficients for Macroeconomic and Dummy Variables (on OCF/S)

Macroeconomic Variables	B	SE	t	VIF
Industrial Production (t,-5)	.000	.000	.951	3.445
Expected Inflation (t,-5)	-.241	.214	-1.124	1.129
Unanticipated Inflation (t,-4)	-.055	.053	-1.052	1.251
Term Structure (t,-2)	-.006	.005	-1.094	2.525
Default Risk (t,-5)	.005	.011	.456	2.818
Sept 11	.005	.008	.699	1.308
Mad Cow	.006	.007	.837	1.098

Notes: SE = Standard Error, VIF = Variance Inflation Factor, R 2= .356, p<.05, Durbin Watson = 2.13

As for industry risk dimensions, only "Output" variable was significant and other two restaurant value drivers were not significant at .05 level (See Table 3). Dummy variables were not significant as well. Results revealed that in aggregate, restaurant industry risk dimensions accounted for over 1/3 of explained variation in operating cash flows which was significant at the .05 level.

Table 3
Regression Coefficients for Industry and Dummy Variables (on OCF/S)

Industry Variables	B	SE	t	VIF
Output (t,-4)	.010	.003	3.215***	1.184
IP Restaurants (t,-5)	.004	.003	1.541	1.085
PPI Meats (t,-5)	-.003	.005	-.569	1.322
Sept 11	.006	.007	.830	1.116
Mad Cow	.002	.007	.349	1.074

Notes: SE = Standard Error, VIF = Variance Inflation Factor , R^2= .334, p<.05, Durbin Watson = 2.43

Last, to assess the unique contribution of the industry risk dimensions we entered 5 macroeconomic variables and 3 industry value drivers into a regression with backward elimination procedure. The final (parsimonious) model, retained 3 dimensions which were all part of the original industry risk model. None of the 5 macroeconomic variables were retained in the final model.

LIMITATIONS

The findings of this study come with some considerable limitations that may affect the generalizability of the results. First, it should be noted that the restaurant industry model consisted primarily of commodity related variables tracked by the National Restaurant Association. This means that items such as coffee prices and wheat prices were not included in the analysis. We are cognizant of the fact that the NRN Index consists of fairly heterogeneous sample which limits the applicability of the industry model.

In addition, we recognize the challenges associated with analyzing the relationships between U.S.-based economic variables (macroeconomic and industry) and variation in operating cash flows as numerous franchising firms have their units outside of the United States. The model may not perform at a desired level for the companies which derive a significant portion of their cash flows from foreign countries.

Last, the author acknowledges the fact that while the study adjusted for seasonality and inflation effects, it did not take into account the business cycle and the life-cycle of the restaurant industry. As Choi (1999) pointed out in his study, the average length of business cycles of restaurant industry (calculated peak-to-peak) was 8 years.

DISCUSSION AND CONCLUSION

To date, this study is the first of its kind to attempt to explore the underlying dimensions of the restaurant industry value drivers and analyze them in a time-series analysis. The approach of this research inquiry differed from the previous works conducted in hospitality field (e.g. Borde, 1998; Gu & Kim, 2003) and offered improvements in multiple aspects. First, the authors of this study made a clear distinction between macroeconomic and industry variables as opposed to combining both of these categories under systematic risk. Second, the author used a sophisticated measure of OCF which was adjusted for accruals as suggested by Sloan (1996).

The qualitative variables did not provide any explanation of variation in OCF which may be partly caused by the method that was employed in scaling OCF of the industry portfolio. That is, as the portfolio was weighed by sales, a drop in sales in the next 6 months after the events of September 11 may reduce the OCF of a given firm but may leave OCF/S unchanged.

This research effort demonstrated that the industry model, which consists of IP, PPI and CPI variables, is able to explain more variance than all variables collectively (industry and macroeconomic) after adjusting for the degrees of freedom. However, it should be noted that this does not explicitly mean that the APT variables are unimportant. Rather, they might be important on their own account in explaining the variation in OCF for individual firms but their effect disappears after the restaurant industry variables are included in the regression equation. Then, it may be hypothesized that macroeconomic variables affect OCF not only in a direct but also in an indirect way (through the industry variables as the macroeconomic indicators are exogenous to industry value drivers). As the theoretical relationship between macroeconomic and industry risk constructs is in its infancy stage, the discussion of this issue is beyond the scope of this study.

This paper provides further support to the claim that industry effects are important determinants of explaining the variation in profits (McGahan & Porter, 1997). Although this paper does not explicitly make a side-by-side comparison of the macroeconomic and industry effects, it does demonstrate that industry dimensions survive when simultaneously regressed with macroeconomic indicators over the value drivers of individual restaurant firms. These results can also be applied to the systematic vs. unsystematic risk analogy of students in strategic management area. That is, systematic risk (e.g. macroeconomic) variables might be still viewed as important determinants of stock returns or variation in OCF of the restaurant firms. Nevertheless, their importance severely diminishes after controlling for the restaurant industry value drivers. In other words, since the OCF is a major component of Free Cash Flows (FCF) and as FCF is used in estimating firm value, then the variation in OCF becomes a critical component in creating value for the firm. Thus, as the industry model helps explain a significant portion of variation in OCF, the executives may use the model to estimate their OCF's risk exposure. By the same token, they can use the other value drivers such as labor cost, beverage cost, food cost, and same store sales to understand which variables of the restaurant model explain the variance in their firm's value drivers.

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Appendix:

List of Variables included in the EFA

	Variable	Code
1	IP – Dairy Products	IPDAIRY
2	IP – Soft Drinks	IPSFDR
3	IP – Cheese	IPCHEESE
4	IP – Butter	IPBUTTER
5	IP – Beef	IPBEEF
6	IP – Pork	IPPORK
7	IP – Miscellaneous Meats	IPMEATS
8	IP – Poultry Processing	IPPOULT
9	CPI – Index	CPINDEX
10	CPI – Tomato	CPITOM
11	PPI – Poultry Processing	PPPOULT
12	PPI – Pork	PPORK
13	PPI – Meats	PPMEAT
14	PPI – Dairy	PPDAIRY
15	PPI – Beef	PPIBEEF
16	PPI – Fluid Milk	PPMILK
17	Aggregate Weekly Hours for Leisure and Hospitality	AGGWKHL
18	Aggregate Weekly Payrolls for Leisure and Hospitality	AGWPAYLH
19	Average Hourly Earnings for Production Workers for Leisure and Hospitality	AHERH
20	Value of Construction Put in Place for Dining/Drinking	CONSDIN

Notes: IP= Industrial Production, PPI=Producer Price Index, CPI= Consumer Price Index